



INTERMEDIATE ENVIRONMENTAL MONITORING REPORT AFTER WORKS n° 1

FUTOG – SUMMARY OF RESULTS

Introduction

The main objective of this environmental report after works is to address the base values of the main parameters identified during the elaborations of the EMRbW. These values were established during the Inception Phase will serve as the base for evaluation of effects of river training and works to the environment.

According to the ToR, the first report will be submitted 6 months after the beginning of the DNP, covering effects of river training works. And second report must be submitted by the S&EM Services Contractor 12 months after the beginning of the DNP, covering effects of both river training and dredging works), identifying all changes in environmental parameters compared to the base values identified in the Environmental Monitoring Report Before Works, also arguing the reasons for these changes, as well as their long-term impact to the integrity of the affected areas.

Works begun at Futog on August 21st, 2018 and officially ended 8th November 2019. So that, after six months this report has the purpose of the status of environment during the Defect Notification Period. The Environmental Monitoring Report after works n° 1 covers the following fields:

- Hydromorphology
- Sediment and water quality
- Waste
- Biology
 - Phytoplankton
 - Macrozoobenthos
 - Vegetation (*Limosella aquatica*)
 - Birds (*Charadrius dubius* and *Riparia riparia*)
 - Fish (*Acipenser ruthenus*)
- Development of vegetation and riparian areas
- Protected Areas and Ecological Networks

The table below shows the works to be carried out in the critical sector Futog and their exact location according to the Final Design:

N°	Name of critical sector	Type of works	Chainage from	to
		Detached groyne	1263+350	
		Chevron	1262+700	

The report shows the status of environment once completed six months since the finalization of works, according to ToR statements.



Description of work site

Construction works were performed on two locations within the subsector Futog 2, on the right side of the Danube River – construction of detached groyne and chevron, dredging work will not finally executed.

Construction works were started at the upstream location, and just after approximately one month they were started at the downstream location.

Floating barge with construction material (position 2 at Figure 1) was used as a temporary storage for solid material like steel armature (reinforcement bar) and new rolls of geotextile are into the foil Floating office (position 3 at Figure 1)

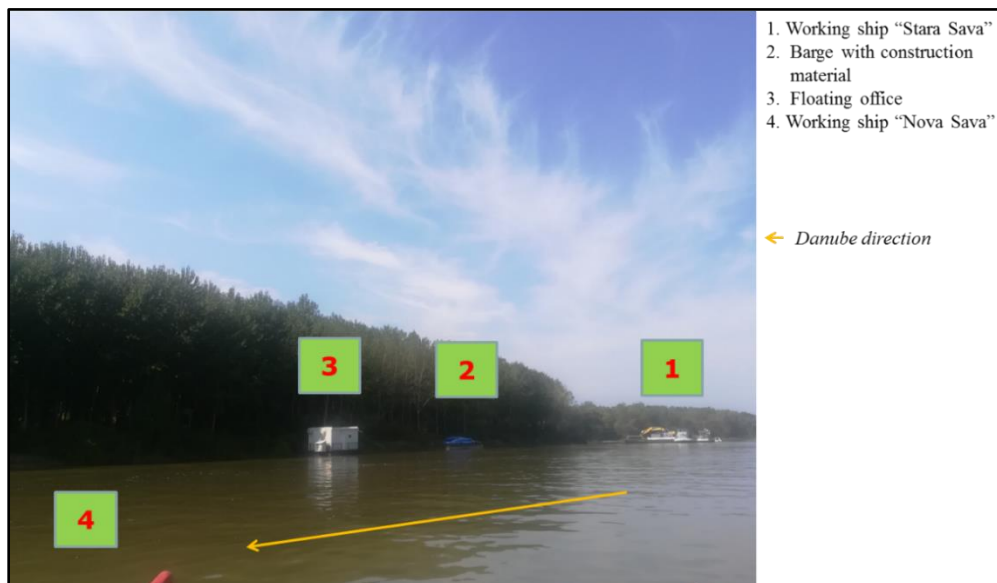


Figure 1 Display of construction sites and auxiliary objects within the Futog critical sector (Futog 2 subsector)

Status of the works after 6 months from DNP

As works ended last 8th November 2019, there is no activity associate to the project on this sector.

Project context

River stretch Futog is located upstream from Novi Sad, second most populated town in Serbia. Its position is between gauging stations Novi Sad and Backa Palanka.





Hydromorphology

As it was asserted in inception report, sandbars on Futog stretch are arranged alternately along the stretch. There are three groups of sandbars, whereof the most obstructive sandbars are located in the central part of stretch. Sandbars along the right riverbank are not so influential on navigation regime.

In general, the development of navigational conditions on the stretch Futog are positive. Available widths and depths are much better compared with conditions from the time of the beginning of construction works (referent bathymetric survey July 2018). Control survey executed in August 2019 showed the best results. Main obstacles (sandbars) has been disappeared, navigation channel in detached groin cross-section was widened and general navigational conditions were significantly enhanced. If we consider effects of executed works, whole stretch should be divided on two stretches, before and after training works. Upstream of detached groin, theoretically morphological changes could be triggered by the work execution, but no way to be direct consequence of this action. Equally, downstream of detached groin, morphological development is direct consequence of executed works. Only concern is actually related to the significant amounts of bedload which are deposits upstream and what would happen when this material comes down in zone of executed constructions.

Unfortunately, Futog stretch is still unstable and after erosion, we have intensified sedimentation. Due to intensive morpho-dynamic, further trends are unpredictable.

From the beginning of Defects Notification Period (8th, November 2019) have passed 6 months. During this period, we had almost whole hydrologic cycle referring on water levels and discharges

It is notable that considered period is characterized with extremely low water levels. In 2019 more than 9 months, water level was below perennial average, between minimal level envelope and average level. In 2020, situation is more dramatic than in 2019. From the end of the first quarter of the April, water levels are even below perennial envelope.

Water quality monitoring

Detailed Monitoring plan for both water and sediment quality was created in accordance with monitoring plan from the Inception Report but also in accordance with currently valid dynamic plan and prediction that working period are going to be longer than it was planned.

During the works execution phase, five regular monitoring campaigns were carried out, one at the beginning of September (07/09/2018), second in the middle of November (23/11/2018) and third in the middle of February (19/02/2019), fourth in the middle of May (13/05/2019) and fifth at the end of August (29/08/2019). During all campaigns, sampling was performed at the position located about 100 m downstream from the works. In the second, third and fourth regular campaigns sample were taken downstream of the last construction site. Sampling and further analyses were performed by accredited laboratory Anahem from Belgrade

In the meantime, 13 water samples in five campaigns were taken for additional screening analyses. Samples were taken upstream and downstream of the construction sites in 22/10/2018 (just for the detached groyne), 30/10/2018 (both for detached groyne and chevron), 19/02/2019 (upstream from the detached groyne and downstream from the chevron), 14/03/2019 (both for detached groyne and downstream for chevron) and 29/08/2019 (upstream and downstream for chevron).

After works execution was finished, in phase of monitoring state on the location after that, and until now, it has been performed one regular sampling and analyses campaign of the Danube River water on Futog location, in accordance with the Intention Monitoring Plan, as well as the ToR. Sampling was performed downstream from the constructed objects, on date 14/05/2020, and full scope of analyses was carried out.

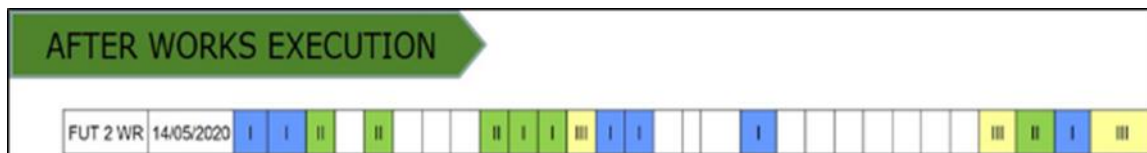


Sediment monitoring

After works execution was finished, in phase of monitoring state on the location, after that and until now, it has been performed one regular a sediment sampling and analyses campaign on Futog location, in accordance with the Intention Monitoring Plan, as well as the ToR. Sampling was performed downstream from the constructed objects, on date 14/05/2020

Review of water and sediment quality results

Results obtained during the first regular sampling campaign, performed in the phase after works execution is finished, were carried out on 14/05/2020 show that quality of the Danube River at location Futog, downstream from the work construction site predominantly corresponds to the quality of water class I, except for parameters dissolved oxygen, total nitrogen and BOD, which correspond to quality water of the II class. Water of the taken sample belongs to the class I for intestinal enterococci, class II for the coliform bacteria of fecal origin, class III for the total coliform and in the class IV for aerobic heterotrophs.



Also, results of the sediment quality obtained during regular monitoring campaigns, within the phase after works executed, performed on 14/05/2020, show that all parameters values are below target values and most of them are not even detected, i.e. that they are on the natural background.

Waste

During this period there has been no activity on the sector, therefore it has not been necessary to control whether there were discharges into the river from the boats.

Phytoplankton

This is typical phytoplankton community structure for this season, characterized by low primary production. Community structure was uniform along depth gradient and among localities

Macrozoobenthos

In the river sediment upstream of groyne, seven individuals of Asian clam (*Corbicula fluminea*) has been recorded. Downstream of chevron, no mussels were found.

In the water, up to 0,5 m depth, and on sandy bank, around 15-20 individuals of Eastern Asiatic freshwater clam (*Sinanodonta woodiana*) have been recorded, some of them 15 cm in length. Some were alive. Several individuals of Swollen river mussel (*Unio tumidus*), 8-9 cm in length and 4-4,5 cm in width, have been recorded in sediment. All mussels were present in the area closer to position of chevron. Several individuals of *Unio* genus remained on bank due to previous higher water level.

Sector	<i>Unio</i> sp.	Other species
Sector 19 Futog	<i>Unio tumidus</i>	<i>Sinanodonta woodiana</i> <i>Corbicula fluminea</i>



Birds

Bird population was diverse in qualitative sense, but not numerous in quantitative sense. Several individuals of Great cormorant (*Phalacrocorax carbo*) were standing on the outer edge of chevron, along with one individual of Grey heron (*Ardea cinerea*) and several individuals of European herring gull (*Larus argentatus*). One individual of Great egret (*Ardea alba*) was recorded in flight, as well as one individual of Common kingfisher (*Alcedo atthis*). Mallards (*Anas platyrhynchos*) were recorded separately with one male, and one female with seven offsprings. Several individuals of Carrion crow (*Corvus corone*) were recorded on the land. Great tit (*Parus major*) was identified by sound. More individuals (15-20) of Swift (*Apus*) were in the fast flight over the water, but it was hard to identified species, *apus* or *pallidus*.

Not any individual of migratory birds *Charadrius dubius* and *Riparia riparia* have been found.

Sector	<i>Charadrius dubius</i>	<i>Riparia riparia</i>	Other species
Sector 19 - Futog	--	--	<i>Phalacrocorax carbo</i> <i>Anas platyrhynchos</i> <i>Ardea alba</i> <i>Ardea cinerea</i> <i>Larus argentatus</i> <i>Alcedo atthis</i> <i>Parus major</i> <i>Corvus corone</i> <i>Apus sp.</i>

Fishes

Standing net in the area of old groynes was without fishes. In pulling the net, in the zone of old groynes, one individual of White bream (*Blicca bjoerkna*) was caught. In the standing net, on the edge of chevron, following fishes were caught: seven individuals of Freshwater bream (*Abramis brama*), one White bream (*Blicca bjoerkna*) and one Asp (*Aspius aspius*). Other species (in the table) were caught in electrofishing between new gryone and chevron. No one individual of Sterlet was found.

Sector	<i>Acipenser ruthenus</i>	Other species
Sector 19 – Futog	--	<i>Alburnus alburnus</i> (19 individuals) <i>Abramis brama</i> (7) <i>Blicca bjoerkna</i> (2) <i>Chondrostoma nasus</i> (3) <i>Cyprinus carpio</i> (1) <i>Aspius aspius</i> (2) <i>Rutilus rutilus</i> (1) <i>Vimba vimba</i> (2) <i>Esox lucius</i> (1) <i>Neogobius melanostomus</i> (2) <i>Silurus glanis</i> (1)



Macrovegetation

All types of vegetation are fully developed. False indigo-bush (*Amorpha fruticosa*) dominates in floor of shrubs closer to the riverbank and are in preparation for flowering. *Galium* sp. and *Rubus* sp. are very abundant in forest habitat and has wide distribution in the upper part of island. Other herbaceous species form dense layer on ground floor. *Salix alba* and *Populus* sp. have stable population in terms of structure and number of individuals. All species are fully leaved.

Sector	Species: <i>Limosella aquatica</i>	Other species
Sector 19 Futog	--	<i>Populus euroamericana</i> <i>Salix alba</i> <i>Quercus</i> sp. <i>Tilia</i> sp. <i>Fraxinus americana</i> <i>Amorpha fruticosa</i> <i>Rubus caesius</i> <i>Erigeron annuus</i> <i>Vitis</i> sp. <i>Chelidonium majus</i> <i>Plantago major</i> <i>Ranunculus sceleratus</i> <i>Ulmus</i> sp. <i>Morus rubra</i> <i>Stellaria media</i> <i>Acer negundo</i> <i>Urtica dioica</i>

Plants

Not any individual of species *Limosella aquatica* and *Lindernia palustris* have been found.

Sector	Species: <i>Limosella aquatica</i> Species: <i>Lindernia palustris</i>
Sector 19 Futog	No results

Development of vegetation

Herbaceous plants are represented by species from families *Rosaceae*, *Asteraceae*, *Vitaceae*, *Papaveraceae*, *Plantaginaceae*, *Ranunculaceae*, *Caryophyllaceae* and *Urticaceae*. Vegetation are regularly developed by floors, and in some area too grown, around 1 m.

Riparian areas

Vegetation are fully developed by floors. Birds are represented by several common genera and species for these types of habitat, some of them have temporarily habitat on the outer edge of chevron. Invertebrate animals are represented by Snails, Mussels and Insects (families *Coccinellidae*, *Curculionidae*, *Pentatomidae*, *Chrysopidae*, *Formicidae* and *Apidae*). Amphibians are represented by Marsh frog (*Pelophylax ridibundus*) and Pool frog (*Pelophylax lessonae*), with around 15-20 individuals. Vegetation and animals are not endangered in no way. Variable water level influences on riparian habitats.



Sector	Species
Sector 19 Futog	Anura – <i>Pelophylax ridibundus</i> , <i>Pelophylax lessonae</i> Gastropoda - <i>Helix pomatia</i> Insecta – Coleoptera (<i>Coccinella septempunctata</i>), Coleoptera (Curculionidae), Hymenoptera (<i>Formica rufa</i> , <i>Apis mellifera</i>), Heteroptera (Pentatomidae), Neuroptera (Chrysopidae), Odonata Lichens – <i>Xanthoria parietina</i> .

Protected areas

In addition, the selected quarry is located inside the National Park Fruška Gora. The mentioned EIA concluded that not any impact could be expected in the National Park due to the fact that the quarry is currently active for some other uses. During this period, negative effect over the National Park of “Fruška Gora” due to the activities of this project have not been observed.

Ecological network

According to Regulation on ecological network (“Official Gazete RS” No. 102/2010), one area (as part of ecological network), relatively close to work zone, is mentioned as ecological corridor of international importance in the Republic of Serbia. This is Monument of nature “Marsh forest on Mačkov sandbank” in the Beočin municipality. Area of protected zone is 4 ha and Danube bank length in protected zone is 0.5 km. Previous and ongoing activities on the critical sector Futog does not show negative effect on the mentioned area.

Summary of results

After field surveys during November 2017, February, March, July, August, October and November 2018 and February, May and August, October 2019, and May 2020 the following target species have been found **in sector Futog**:

Sector	Macrozoo benthos (<i>Unio sp</i>)	Fishes (<i>Acipenser ruthenus</i>)	Plants (<i>Limosella aquatica</i>)	Plants (<i>Lindernia palustris</i>)	Birds <i>Riparia riparia</i>	Birds <i>Charadrius dubius</i>
Nov 2017	-	-	-	≈10 individuals	-	-
Feb 2018	-	-	-	-	-	-
March 2018	-	-	-	-	-	-
July 2018	-	-	-	-	-	-
Aug 2018	-	-	-	-	-	-
Oct 2018	1	-	-	-	-	-
Nov 2018	--	-	-	-	-	-
Feb 2019	1	-	-	-	-	-
May 2019	1	-	-	-	-	-
August 2019	1	-	-	-	-	-



October 2019		2 individuals				
May 2020	5-7	-				

Summary of main impacts in the sector during this period

On this sector was defined the construction of some river training structures and dredging works. These activities included dredging in the central part of the river between km 1266 and km 1265 of approx. 157,456.90 m³ sediment and the construction of a detached downstream facing groyne at km 1263.35 and a chevron at km 1262.8-1262.7 both located along the right bank. Training structures have been built in the defined location, however, technical decision after several analysis concluded that dredging works were not necessary at this moment.

Several monitorings have been executed during construction phase, which results have been compared with surveys carried out in May 2020 in order to compare the status of environment six months after works finalization.

Regarding water and sediments, after this period it is possible to conclude that there are no significant effect over these parameters. The obtained results during field surveys in May are significantly similar to the previous ones. This can be interpreted as the works have not been affected the quality of water and sediments in the vicinity of critical sector of Futog.

From the point of view of biology, the results show that the nature has not been affected by the works, which confirms the conclusion obtained in previous reports.

Bearing in mind that works were being executed from the water, the riparian vegetation existing in the riverbanks have not suffered any impact except a little dust deposited on leaves. This impact cannot be avoided because mainly depends on wind direction. However, it is not significant and the general status of riparian habitat remains in good conditions.

None of individuals of protected species of plants had been affected during those months and wildlife seemed not to be impressed by the presence of machinery and workers. Protected species of birds have not been detected in Futog in any of the field surveys.

Finally, although one individual of *Unio turmidus* were found in water sediments, the place is located near 100 m downstream the work site.

This first survey after six months without works disturbances shows how the environment in vicinity of structures remains in the same conditions as was addressed in monitoring made before works.

Protective and corrective measures

As works on critical sector Futog finished in November 2019 there is no need to apply protective or corrective measures.

Conclusions & Recommendations

It is necessary to monitor the same parameters after six months to complete one year after works finalization.

Works that are being executed in another sector will be assess in different report.